

Cooled Bolometer IR Monolithic FPA, Phase I

Completed Technology Project (2007 - 2007)



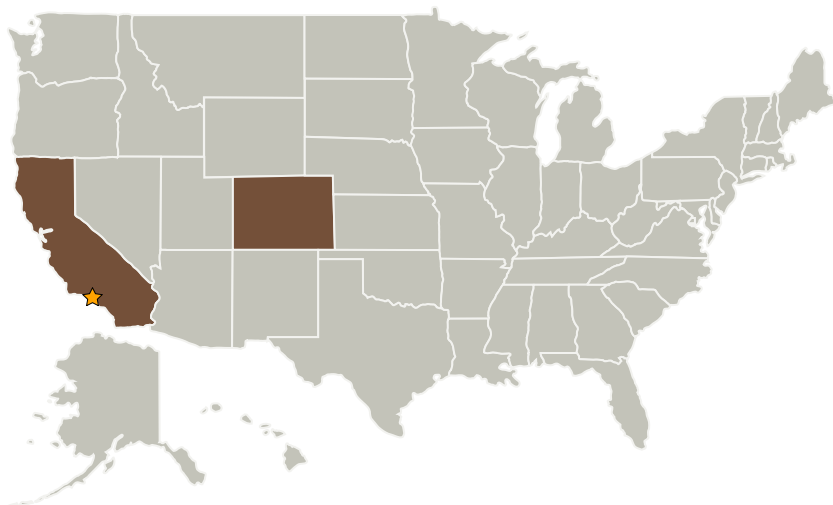
Project Introduction

Future space-based observatories imaging in the 4-40 μm spectral regime will be passively cooled. The objective of this research effort is to demonstrate near theoretical performance of bolometer-based infrared focal plane arrays (FPAs) covering the 4-40 μm wavelength region by operating the FPA at reduced temperature. Amorphous silicon-alloy resistive bolometers exhibit increased temperature coefficient of resistance when cooled below room temperature and are well suited for operation over the 30K-200K detector temperature range. Detector process optimization will allow performance levels close to theoretical limits. The cooled bolometer is compatible with advanced readout technologies, such as switched capacitor integrators, offered by Black Forest Engineering. The amorphous silicon-alloy bolometer process, optimized on Phase I for cryogenic operation, will be a basis for future large format monolithic 1024x768 format FPAs fabricated on Phase II to support NASA passively cooled imaging applications and DoD/commercial cryo-cooled systems.

Anticipated Benefits

Potential NASA Commercial Applications: The cooled amorphous silicon alloy FPA achieves high performance with reduced thermal isolation. This allows high performance to be achieved with a fast thermal time constant and resultant fast frame rates. A micro-scanned version of the cooled bolometer FPA (optimized for 120-240 frames per second while maintaining high sensitivity) is ideal for micro-scanned forward looking infrared (FLIR) applications where high resolution is required with small optical assemblies.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Black Forest Engineering, LLC	Supporting Organization	Industry	Colorado Springs, Colorado

Primary U.S. Work Locations

California	Colorado
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Project Transitions

**January 2007:** Project Start**July 2007:** Closed out**Closeout Summary:** Cooled Bolometer IR Monolithic FPA, Phase I Project Image

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Stephen Gaalema

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes